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Project Summary

ORIGINAL
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Health Implications of Coal Related Energy Development: Mining Impacts

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The purpose of this project was to establish a method for prospective epidemiological analysis of the potential human health effects associated with the development of western coal sites. Particular emphasis was placed on potential human health effects related to mining and mining effluents which may enter drinking water supplies. The study area included Colorado, Utah, Montana, Wyoming, and the Dakotas - U.S. EPA Region VIII. This research involved: 1) development of criteria for selection of potential study communities; 2) characterization of human health and environmental quality in the region as a whole; 3) determination data requirements for prospective epidemiological studies; and 4) evaluation of the quality of environmental, human health, and demographic data currently available in the suggested study communities.

Characterization of human health and environmental quality in the region as a whole consisted of obtaining and assembling baseline data on demographic trends, health status, community health and sanitation services, and environmental quality. County based data was examined looking for unusual patterns of morbidity and mortality. The only cause of death showing geographic association with mining activity was due to motor vehicle accidents. While the results suggest that no unusual patterns of mortality exist in the study area, additional data on human health status needs to be analyzed to examine water-mediated human health effects due to coal mining activities in specific communities.

This Project Summary was developed by EPA's Health Effects Research Laboratory, Cincinnati, Ohio, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Introduction

Energy production continues to be a major concern. One facet of interest is technological development necessary to discover and harness new sources of energy. Clearly, there must be a concomitant consideration of the environmental and human health impacts of energy development. In examining the potential human health impacts of the rapid expansion of western coal mining activities, this project explores only one facet of energy production within the region and the United States. However, the magnitude of expected increases of coal utilization and coal mining activities in this region requires that the environmental and human health implications of this development be monitored. At present little knowledge exists in this area. Ultimately, insights gained from this project and subsequent epidemiologic investigations relevant to the human costs of energy development may be used as a basis for more

informed decisions regarding development and/or expansion of energy resources.

Coal is abundant in the United States. Along with petroleum and natural gas, coal provides the major source of energy within the United States. Of the three fuels, coal is the most abundant with recoverable resources containing about ten times the energy value as the combined recoverable resources of petroleum and natual gas. Depleted reserves of petroleum and natural gas and their increased cost has placed coal as an important contributor of U.S. energy through such schemes as coal gasification, coal liquefication, and fluidized-bed combustion. Besides these 'new' markets, coal continues to be a major source of energy for the utility industry.

In response to increased demand for coal, rapid expansion of coal mining activity is anticipated. Important environmental considerations for this expansion are: 1) the location of proven coal reserves; 2) characteristics of the coal (rank, grade, specific gravity); 3) thickness of the beds, thickness of the overburden; and 4) a variety of commercial factors including labor, equipment, and transportation costs.

The United States is divided into three coal-producing regions; western, midwestern, and eastern. The western region contains the bulk of proven reserves, is presently undergoing rapid development, and is the study area for this project.

In attempting to quantify and/or project impacts of energy development on human mortality, morbidity, or changes in health status, detailed empirical studies of residents in specific communities are essential.

Two sets of health effects must be considered in evaluating the causal effects of energy development on health status. First, the possible etiologic significance of the products and processes employed in the various industrial activities must be investigated. The other set is due to the result of boomtown conditions (e.g., increases in population, inadequate housing, crowding, unmet demand for health and sanitation services). Three types of health problems can be anticipated: occupation associated illnesses; potential problems caused by industrial activities degrading the environment, and the many significant health and social problems related to rapid and unplanned community growth which accompanies uneven population changes.

This project primarily addresses impacts due to environmental degradation by mining activities. Many human health implications can arise due to this degradation. Industrial activities connected with construction of highways, commercial establishments (especially electric power plants), and housing inevitably accompany increases in mining activity. Thus, human health effects must be considered as part of the overall costs of development. It is essential to realize that changes in health status subsequent to mining activity reflect these 'indirect' as well as 'direct' impacts.

Results

Environmental impacts may be expected in at least four areas: 1) water quality; 2) air quality; 3) sanitation and public health; and 4) social environment. An overview of these impacts follows with major emphasis on water quality.

Water Quality:

High variability in water quality exists due to diversity of the environment in the western United States. Thus, impacts of mining activities will need to be evaluated on an individual basis. There is a critical need for longitudinal studies of water quality comparing significant parameters pre- and post-mining to assess the trends in surface and ground water quality and quantity as mining and reclamation activities increase.

During the mining operation, surface waters are impacted due to disruption of drainage patterns. The amount of disruption varies depending on ecologic factors peculiar to the area. Groundwater can be severely impacted, including the removal of the aquifer (coal seams are frequently aquifers); a change in the recharge-discharge relationships; quality changes; and lowering of water tables. Reclamation would not restore the original aquifier since the backfill material would have different hydrologic characteristics.

Serious political conflicts with economic roots can arise if water quality and quantity are markedly altered. Many users in the region have established rights to defined water resources and are engaged in activities which depend on the continued availability of water.

Several assessments have concluded that energy development in this region does not create new problems as much as exacerbate existing ones. The water quality impact of western energy resource development could include: 1) hazardous runoff from mines, spoils piles, facilities, and urban areas; 2) increasing concentration of various salts in surface waters; 3) accidental introduction of pollutants; and 4) contamination of groundwater.

Air Quality:

The extraction of millions of tons of coal annually will result in the deterioration of air quality. Maximum impacts are expected to occur when developing mines reach their full production capacity. The effects should decrease over the remaining years of production. Both direct impacts from the mining operation and indirect impacts due to population influx are anticipated.

Social Environment:

The rapid growth in population experienced by many western communities as a result of mining activities creates some potentially serious social problems. These problems are aggravated by the unique characteristics of the area. With the low density population, many interpersonal relationships (financial and other) are based on an informal system of trust. This system must be replaced by a more impersonal and formal mode of interaction as longtime residents cope with the influx of newcomers.

One of the major problems these communities face is inadequate housing. Newcomers in an area find it difficult to purchase homes. As a result, trailer and rental living predominate, with overcrowding developing rapidly. This in turn places additional burdens on community public services.

Data Availability:

The quantity and quality of environmental, demographic, and human health data currently available in the study area is inadequate for an evaluation of the human health implications of coal mining development. This lack of appropriate data is not unique to this study area. A key aspect of preventive public health practices is the surveillance of environmental quality per human populations in a study area. In this way data can be generated which is relevant for the assessment of real or potential human health effects of increased coal mining activities.

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The complete report, entitled "Health Implications of Coal Related Energy Development: Mining Impacts," (Order No. PB 82-109 836; Cost: $21.50, subject to change) will be available only from:

National Technical Information Service
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Springfield, VA 22161
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